Slide Organization

Good Examples

Slides should be well-balanced, flow logically, and not excessively cluttered

Avian Influenza A Viruses

1) **Influenza A H5:**
   (H5N1) •9 Subtypes •HP or LP
2) **Influenza A H7:**
   (H7N3, H7N7) •9 Subtypes •HP or LP
3) **Influenza A H9:**
   (H9N2) •9 Subtypes •LP

HP: Severe illness and death in humans

LP: Conjunctivitis, Upper respiratory symptoms

Only 3 human infections confirmed

HPAI H5N1: Fast mutating virus → Epizootic (non-humans); Panzootic (multiple spp)

Routes of Transmission

Oral inoculation

Ingestion

5 – 7 days

Necrophagy

Cannibalism

D. Pfennig

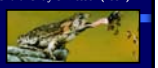
Water Bath Contaminated Sediment

Time to signs: 1 – 2 weeks

Time to mortality: 2 – 4 weeks

Brunner et al. (2004), Pearman et al. (2004), Harp & Petranka (2006)

Gruia-Gray & Desser (1992)



Invertebrates

(needs to be tested!)

Horizontal vs. Vertical:

•Only Horizontal Transmission Demonstrated

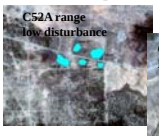
•Duffus et al. (2008): Vertical Transmission Suspected

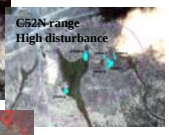
Slide Organization
Bad Example

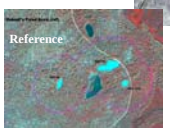
Sampling design-Gopher frogs

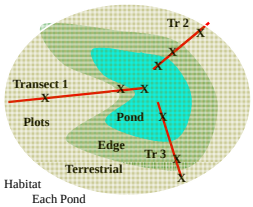
9 "Treatment" areas
- **3 High disturbance** (C52N, C74, C52CE)
- **3 low disturbance** (C52C, C52A, B70)
- **3 Reference**

2-6 Ponds per treatment









Habitat
- Each Pond
  - Morphology, water quality, general substrate, vegetation, and military disturbance
- Edge/Terrestrial
  - 2-3 transects per pond
  - random plots within each community type
  - % cover plant layers; disturbance metrics, no of burrows, etc.
- Remote sensing 300 m home range

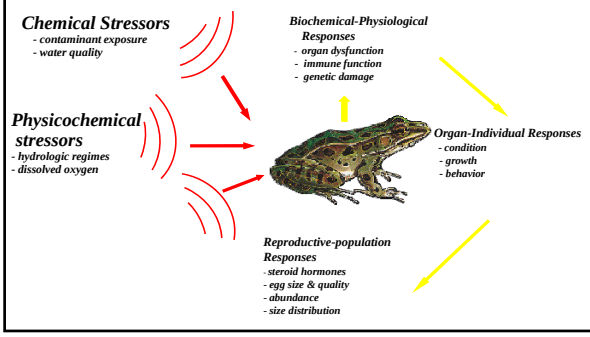


Image Clarity
Good Examples

Images should not be blurry.

Spill-over Reservoirs
Pigs, Cats, and Others

Pigs:
- Carry H3N2 (dominant annual human flu)
- H5N1 isolated in 2004 (China)
- Antigenic shift: novel virus

H3N2 ⟷ H5N1

Cats:
- Can be infected with H5N1 (eating infected carcass)
- 140 tigers died in Thailand
- Excrete 1/1000 of the amt of virus compared to chickens

Mice, Ferrets:
- Have been infected with H5N1 in Lab

(documented causing systemic infections)

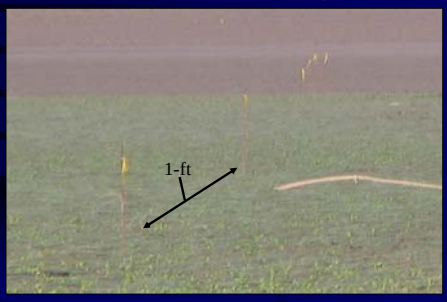
Image Clarity

Bad Examples

Methods (Field)

3) Food Resources

(i.e., invertebrates, moist-soil seeds, and vegetative browse)



Conservation Implications

- **Cattle may be contributing to amphibian declines**
- **Exclusion of cattle from wetlands and adjacent habitat**
- **Partially fencing cattle from wetlands and providing alternative food and water sources**

No Excessive Text
Good Example

Minimize text to bullets of large concepts or points. Avoid excessive descriptions. No paragraphs.

Classifications of Subtypes

Classified based on the severity of illness

1) **Low Pathogenic (LP) :**
   - **Mild symptoms to influenza-like illness**
2) **Highly Pathogenic (HP):**
   - **Severe illness and possibly death**

No Excessive Text
Poor Example

Ranavirus

- Transmission:
  - HORIZONTAL only but still testing for vertical (Duffus *et al* 2008)
- Distribution:
  - Global
- Wildlife Implications:
  - Some species are very sensitive and die, others subclinical
  - Severity seems to be affected by stress
- Public Health: Iridovirus NOT in mammals BUT…if infected amphibians are then prone to opportunistic pathogens, these secondary invaders may be problematic to public health (e.g., E coli, Salmonella, Cryptosporidium)

No Extensive Tables

Poor Example

In general, avoid use of tables in presentations unless very simple. Use color coding, arrows or boxes to direct attention if a table is necessary.

Confirmed Cases & Deaths by Country

01 October 2007

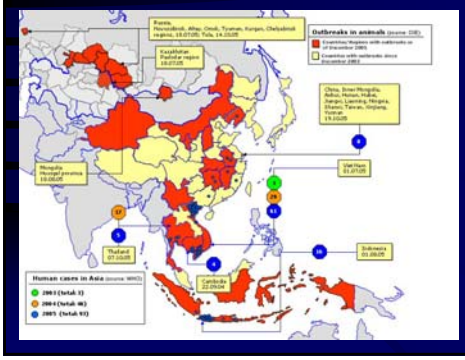
Country	2003		2004		2005		2006		2007		2003-07	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Azerbaijan	0	0	0	0	0	0	8	5	0	0	8	5
Cambodia	0	0	0	0	4	4	2	2	1	1	7	7
China	1	1	0	0	8	5	13	8	3	2	25	16
Djibouti	0	0	0	0	0	0	1	0	0	0	1	0
Egypt	0	0	0	0	0	0	18	10	20	5	**38**	**15**
Indonesia	0	0	0	0	20	13	55	45	31	27	**106**	**85**
Iraq	0	0	0	0	0	0	3	2	0	0	3	2
Lao People's Democratic Republic	0	0	0	0	0	0	0	0	2	2	2	2
Nigeria	0	0	0	0	0	0	0	0	1	1	1	1
Thailand	0	0	17	12	5	2	3	3	0	0	25	17
Turkey	0	0	0	0	0	0	12	4	0	0	12	4
Viet Nam	3	3	29	20	61	19	0	0	7	4	**100**	**46**
Total	4	4	46	32	98	43	115	79	65	42	**328**	**200**

No Cluttered Figures

Poor Example

Figures should be simple without excessive text. Explain figure structure (e.g., X and Y axes).

Epidemiology of HPAI H5N1



1997:

- First Human Case
- Hong Kong: 6/18

2003:

- China: 2/3
- Poultry Farms
  - 3 Flocks Korea

2004:

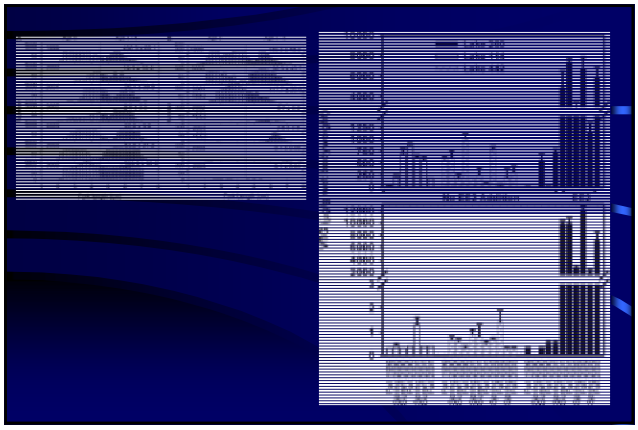
- Vietnam, Thailand
  - Few Weeks: 10 Countries (Asia)
- Waterfowl spreading

2005:

- Vietnam (33/64, 1 mil)
- Russia, Kazakhstan

2006:

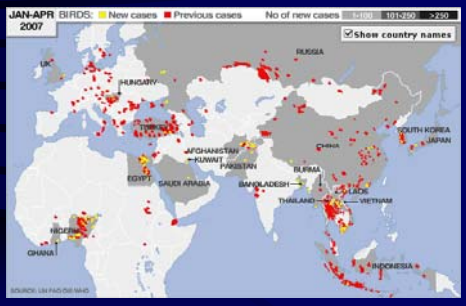
- Europe, Africa



No Cluttered Figures

Good Examples

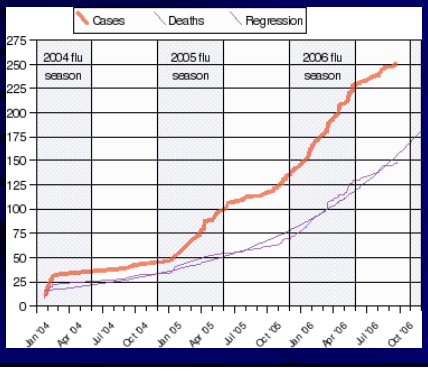
Epidemiology of HPAI H5N1



http://news.bbc.co.uk/1/shared/spl/hi/world/05/bird_flu_map/html/1.stm

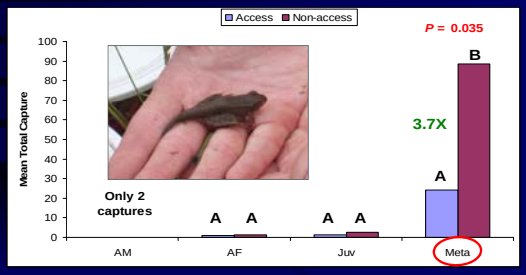
Number of HPAI H5N1 Cases & Deaths

2004 to 2006



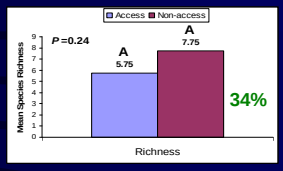
Results

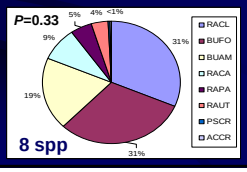
Green Frog Demographics



Results

Species Richness and Composition





Results

Modeling Green Frog Metamorph Abundance

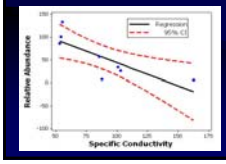
Significant Environmental Cofactors:

Vegetation: Percent Horizontal and Vertical Cover, and Plant Height

Water: NH_3, NH_4^+, Turbidity and Specific Conductivity

$$\text{Capture} = -0.77(\text{SpCond}) + 0.41(\text{HorzCover})$$

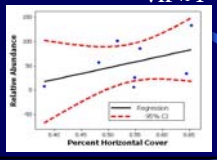
CN & VIF ≈ 1



$R^2_{adj} = 0.73$

64% = SpCond

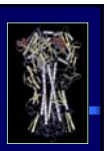
9% = HorzCov



Complimentary Colors
Good Examples

Use different text colors to highlight points. Always use bolded text. Use opaque boxes to help text stand out. Avoid florescent colors, especially red. Colors should contrast with slide background.

Influenza Viruses



Types: A, B, C

- Humans can be infected by all types
- Birds can be infected by Type A only

Wild birds: Reservoir of Type A

Subtypes: Surface Glycoprotein: HA (16), NA (9)

H1, H2, H3

- Hemagglutinin (HA): Binds virus to cell

N1, N2, N3, N7
(H1N1, H1N2, H3N2)

- Nueorominidase (NA): Releases progeny virus particles → virulence

Strains:
(clades 1, 2, …)

Slight differences in HA or NA genes such that antibodies do not recognize.

Influenza Pandemics
(all of avian origin!)

1918: H1N1 "Spanish Flu"
- 50-100 million
- Worst pandemic in history
- 2 days: healthy individuals

1957: H2N2 "Asian Flu"
- 1-2 million

1968: H3N2 "Hong Kong Flu"
- 1 million

Children and elderly

300K-500K die annually

Complimentary Colors

Bad Example

Lucke Frog Herpesvirus

- Frog; egg/tadpole/adult (only prob in adult)
- Synonyms:
  - Lucke tumor herpesvirus
  - Ranid Herpesvirus 1
- Etiologic Agent: Herpesvirus
  - Fish, amphibian and reptile herpes; not certain how related to mammalian or avian herpes (i.e., alpha, beta, gamma).
  - Green sea turtle herpes causing fibropapillomas: novel alphaherpes.
- Host:
  - Appears to be VERY SPECIES SPECIFIC
  - Northern leopard frog (*Rana pipiens*)
  - but may be others we just haven't investigated enough

Transmission of HPAI Viruses

Avifauna:

- **Direct with saliva, nasal secretions, and feces**
- **Fecal-to-oral transmission**
- **Waterbirds: carry virus in feces and shed it**
- **Poultry: dirt, cages, water, feed**

Humans:

- **Cases are rare (329 to date)**
- **Contact with infected poultry or contaminated surface (closer 1 m); 2 from uncooked duck blood**
- **Unknown but likely inhale aerosolized virus particles (or ingest feces/uncooked animal parts)**
- **9 cases of human-human transmission**

Text Transitions

Good Examples

Transition bullets and images to direct attention.

Reservoirs and Environmental Persistence

Vertebrate Reservoirs:

(1) Amphibians

- **Intraspecific Reservoirs** (Brunner et al. 2004)
- **Salamanders** (Duffus et al. 2008)
- **Overwintering Tadpoles** (Gray et al. 2007)
- ***Xenopus laevis*** (Robert et al. 2007)

Jancovich et al. (2001)

ATV did not infect tadpoles or fish

(2) Fish:

- **BIV & barramundi** (Moody & Owens 1994)
- **SBV & TV2 viruses identical** (Mao et al. 1999)

(3) Turtles: •**Eastern box turtle** (Allender et al. 2006)

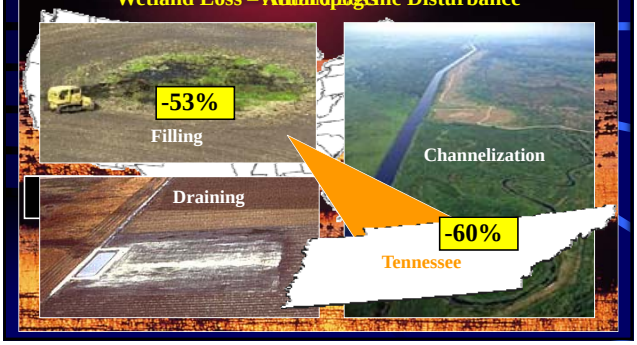
Environmental Persistence:

$10^3 – 10^4$ PFUs mL^{-1}

- **ATV: 2 weeks @ 25 C water bath lost infectious capability.** Jancovich et al. (1997)
- **EHNV:**
  - **Distilled water = 97 days**
  - **Dry surfaces = 113 – 200 days** Langdon (1989)

Introduction

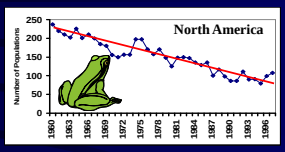
Wetland Loss – Anthropogenic Disturbance



Amphibian Declines and Emerging Infectious Diseases

Science 306:1783-1786

EID 5:735-748



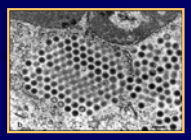
Nature 404:752-755

Biotropica 37:163-165

Chytrid Fungus

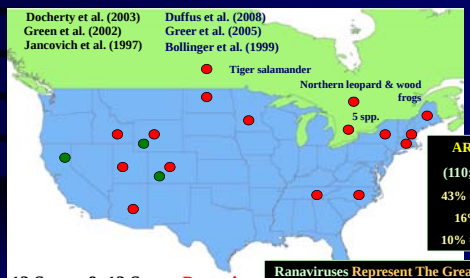
Adults: >95%

Larvae: 80-100% (Europe)



Ranaviruses

Reported Amphibian Die-offs in North America: *Ranavirus*



ARMI 2006

(110; 34 states)

43% = *Ranavirus*

16% = fungi

10% = protozoan

12 States & 12 Spp = *Ranavirus*

3 States & 3 Spp = Chytrid

Ranaviruses Represent The Greatest Threat to Loss of Amphibian Biodiversity in North America.

Methods (Field)

3) Food Resources: Vegetative Response

Seed Production

30 Randomly Selected Individuals

Text Transitions
Bad Example

Clinical Effects of HPAI

Avifauna:

- 90-100% Mortality in 48 hrs
- Petechial Hemorrhaging
  - Larynx, Trachea, Proventriculus
- LPAI (reduction in weight or egg production, soft eggs)

Humans:

Viral Pneumonia

- Alveolar Inflammation
  - Hemorrhaging of epithelial cells
- Obstruction of Airways
  - Decreased Oxygen Diffusion
- Renal failure, hepatic symptoms